DOCUMENT RESUME

ED 474 552 IR 021 846

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TITLE	Proposed Curriculum Design for a 2-Year College of Technology.
PUB DATE	2002-08-00
NOTE	12p.
PUB TYPE	Reports - Research (143)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Case Studies; *Curriculum Design; *Curriculum Development; Foreign Countries; Higher Education; Models; *Technical Institutes
IDENTIFIERS	*Course Development; Taiwan

ABSTRACT

This paper presents a curriculum-oriented model focusing on curriculum revision of the design and structures of two-year academic institutes of technology. This research uses the Department of Business and Technology Management, which is being set up in the Far East Institute of Technology (Taiwan), as an example and works out the new models focusing on a vocational capacity competence-oriented curriculum. Part I, the introduction, summarizes the background, motivation, method, and purpose of the research. Part II discusses the problems of the current curriculum design, including: the continuity issue of the technological curriculum design and development; lack of practical courses and overlapping; the problems of pursuing further education; the abilities of the applicants; the problems and bottleneck of the radical shift in industrial development; and the problem of course enrollment, including the principles of practicality, perspectives, flexibility, integration, and continuity. Part III is a literature review covering: the curriculum model designed and guided by the Ministry of Education in Taiwan; a developmental model for a technological and vocational education curriculum; the cluster model for curriculum design; and the Skilbeck style of course development model on the school basis. Part IV describes the model of curriculum design for two-year technological and vocational university education. Part V presents a case study of the Far East Institute of Technology to clarify the model. Part VI offers conclusions and suggestions. (MES)

PROPOSED CURRICULUM DESIGN FOR A 2-YEAR COLLEGE OF TECHNOLOGY

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August 2002

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Summary

It has become an important trend for junior colleges, which academically performed well, to be promoted into two-year academic institutes of technology in Taiwan's current technological and vocational educational system. After transformation, these new two-year academic institutes of technology have to distinguish their educational goals from those of the previous junior colleges. Also, the development and design of the curriculum in these two-year academic institutes of technology have to combine industrial practicality with academic theory to cultivate new students with good potential for further self-development and suitability for the variety of future job market.

Based on the primary needs provided by the author in the first paragraph, both through literary review and the academic conferences of the experts, this research paper will present a concrete curriculum-oriented model focusing on curriculum revising on the design and structures in previous two-year academic institutes of technology. Furthermore, this research will take the Department of Business and Technology Management, which is about to be set up in the Far-East Institute of Technology, as an example, and try to work out the new models focusing on a vocational capacity competence-oriented curriculum. At the same time, the research will match the educational goals and specify the characteristics of this department in the current situation.

Keywords: Vocational Education, Curriculum Design.

I. Introduction:

The Background and Motivation of the Research

In order to accommodate new technical developments and industrial changes in Taiwan, establish a well-organized technological and vocational educational system, give previous junior college graduates more opportunities to get higher degrees, and cultivate students who have both strong academic and practical background, the Ministry of Education in Taiwan encourages the promotion of junior colleges into two-year academic institutes of technology if the junior college has good evaluation credits from the Ministry of Education. According to the statistical documents from the Department of Technological and Vocational Education of the Ministry of Education, R.O.C, during the school year periods from September, 1996 to May, 1999, fifty-three have been successfully promoted from junior colleges into two-year institutes of technology.

In addition to creating the learning environments for the students' unobstructed progress to higher degrees, many major aspects, including educational goals, curriculum design, student discipline, methods of teaching, tools of practice, research and development, cooperative training, etc. should be reconsidered and put into the proper position. As far as the goals of education are concerned, the primary goals of junior colleges are to instruct students prepared in applied science and technology to be competent in the practical job fields. However, after the transformation and promotion, these new two-year institute of technology students will focus mainly on technical theory research and become engineering experts (Wu King Chi, R.O.C 83). Furthermore, the distinction between two-year institutes of technology and the ordinary

engineering institutes in universities should also be clarified. The former is to cultivate the graduates to become competent engineering technologists, the latter, on the contrary, will be engineers. (Chang Tai Gem R.O.C 85).

There is no doubt that the contents of curriculum design for promoting human qualities play a key role in the educational field; moreover, it will surely affect the possibility of success and quality of the educational goal. Due to the Taiwan's technological and scientific ability, quick improvement with strong economic growth and rapid shifts into the structures of industrial society, how to design the curriculum and cultivate talented people for the economic market matching the technological, economical, and industrial developments in Taiwan will become an important issue.

The Method and Purpose of this Research

Focusing on the needs assessments mentioned above, using literature review and conferences with experts to gather the data, and taking Department of Business and Technology Administration in the Far East Institute of Technology as an example, the researcher will try to design the vocational and technological education-oriented curriculum model as the reference for other schools' constructing the outline of the curriculum design.

II. The Problems of the Current Curriculum Design:

After the promotion of these junior colleges, many educational scholars indicate that a lot of problems and difficulties must be overcome concerning the curriculum design and development (Wang zany Jan, R.O.C 89; Lee long Sang, R.O.C 88; To Ming Zany, R.O.C. 88, Chang Dian Shing, R.O.C 87, Chang Tan Ching, R.O.C 85). These comments will sort into the follow details:

1 "Continuity" Issue on the Technological Curriculum Design and Development

There are very serious problems, including overlapping and segregation without integration in the curriculum design in Taiwan's technological and vocational education due to the discrepancies between senior vocational high schools, junior colleges and two-year institutes of technology: for example, the mechanical engineering courses, such as mechanics, that overlap in senior high vocational schools and junior colleges. However, some kinds of the integrative courses, such as electrical engineering courses in two-year institutes of technology are hardly being taught in vocational schools and junior colleges.

2 Lack of Practical Courses and Overlapping

In order to promote the quality of education, many newly-promoted two-year academic institutes of technology adopt the English-version text books that are originally used in the ordinary Universities; moreover, the academic-oriented theoretical courses, such as advanced statistics and advanced materials theory, get more and more weight in the curriculum. This situation will cause severe gaps between practice and theory besides the academic burdens on students' reading and learning comprehension because of their poor English abilities.

3 The Problems of Pursuing Further Education:

The main educational goal for the two-year institutes of technology is to promote students to get a practical technical job meeting current market needs. However, plenty of students have the intention to continue studying in graduate school after finishing the courses in two-year institutes of technology. After choosing the practical courses, they intend to take the academic-oriented ones for preparation for their further education exam and ignore some non-relevant courses.

4 The Abilities of the Applicants:

There are no strict academic requirements for prospective students, who have diverse backgrounds or different majors, intending to apply for the two-year institutes of technology. For instance, the applicants who apply to the electrical engineering program may have a background in mechanical engineering, electronic engineering, or even automation engineering. Besides, many applicants may have graduated from junior colleges or a five-year junior college. Because some courses they have taken or majored in are irrelevant to the current curriculum, these freshmen will cause difficulties for the professor's instruction when new courses begin.

5 The Problems and Bottleneck of Radical Shift in Industrial Development:

To accommodate the radical developments of technology and rapid changes in the industrial market in Taiwan, the curriculum design should be examined and adjusted continuously and be flexible to meet the needs of the industry. For example, the curriculum design should focus on the mechanical engineering practical classes, such as CNC, CAD/CAM, automatic control, and electrical engineering courses. As for the mechanical welding skills, which most of the factories do not need, they could be cancelled or integrated into another subject, as the basic credits or units of the elementary program.

6 The Problem of Course Enrollment:

Most of the universities will issue referential pamphlets or handbooks for students' course enrollments. These references or handbooks include details on course schedules, outlines, and credit hours. However, sometimes the information is too brief and simple to give the students overall and concrete ideas on how to enroll courses properly and efficiently. Besides, the deficiency of a course enrollment supportive system in most of the schools will cause students' making serious mistakes in their course selection, and result in unsystematic learning.

To sum up, from the problems mentioned above, to enhance the efficiency of learning and achieve the educational goal, the researcher or curriculum designer should follow these important principles when implementing the curriculum design:

(1) The Principle of Practicality:

The curriculum design should put the emphasis on being practical and pragmatic to match the various needs of the industry.

(2) The Principle of Perspectives:

To accommodate the shifts of industry needs, the contents of the course designs have to focus on establishing the concepts and induce the students' continuous motivation for self-education.

(3) The Principle of Flexibility:

All of the curriculum structures must contain the flexibility, which means being easily adjusted, to keep up with the rapid changes of the technological and industrial environment.

(4) The Principle of Integration:

To prevent the students from becoming too specific in learning, the design of the curriculum should take the principle of integration, which means combining the relevant subjects with the core concepts, into serious consideration.

(5) The Principle of Continuity:

When designing the two-year institute of technology curriculum design, the curriculum designer should consider the principle of continuity to prevent the courses from being overlapping or segregated.

III. Literature Review:

The "curriculum" is the result of the learning experiences of students under the instruction of the schools (Huang zany jai, R.O.C 87). Also, the curriculum is the meaningful activities that stem from the delicate and well-organized instruction designed by instructors (Tu Ming zany, etc. R.O.C 88); therefore, it is the main body of the education. Meanwhile, Scholar Kang points out that technological education has the following characteristics: (Kang zany lei R.O.C 84)

(1) As Far as the Aim of the Curriculum is Concerned: The aim of technological and vocational education is to cultivate the sound and well-disciplined modern citizens that have strong capacity and integrity, and what's important, the career competence of being easily employed in the job market.

(2) As Far as the Design of the Curriculum is Concerned: The curriculum design has to be in accordance with the fluctuation of the job market and the ability analysis of the students. Meanwhile, the curriculum design should maintain flexibility to cope with the fast development of industry and the technical environment.

(3) As far as the Implementing of the Curriculum is Concerned: To combine the learning experiences with the needs of the industry, and theory with practical needs, the implementation

of the curriculum has to enhance cooperation between enterprise and school, and keep the good connection between both of them.

(4) As far as the Evaluation of the Curriculum is Concerned: The conformity between the interior indicator, the effectiveness of learning, and the external indicator, the career performance, should be emphasized and corresponded, and these two indicators should be the two major criteria to evaluate the validity of the curriculum.

Scholar Chao (Chaos Chi Yang, R.O.C 85) indicates that technological and vocational education is not only the reflection of the changes and needs of the industry, but a dynamic "process of forming". Through continuous response and feedback during the teaching and instruction process, the curriculum designer should put the new and latest elements and perspectives into the process of forming the curriculum.

Skilbeck (1985) points out that when designing the curriculum, the designer has to pay attention to the organization and the structure of the curriculum. For the organization of the curriculum, which is to set the educational goal according to the necessity of human resources, and to evaluate the students' performance during the teaching process. The students could learn all of the courses systematically arranged by the educational goals.

There are several curriculum design models which are widely applied from the current technological and vocational education system in Taiwan. (Ling Chun Yan R.O.C 89, Huang Ben hang, R.O.C 77, Huang Ting haul, R.O.C 88; Skilbeck, 1994):

1. The Curriculum Model Designed and Guided by the Ministry of Education in Taiwan:

This model is the school-based model, and the process of designing the curriculum is listed below:
(1) The Phase of Preparation: To draw up the curriculum plans and establish the curriculum committee to collect the relevant information.

(2) The Phase of Strategy Development: To establish the educational goals for each school, the designer has to set up the basic requirements of credits that students must complete, and set up the proper proportion of each course, and the principles of the course development.

(3) The Phase of Curriculum Development: Develop the general knowledge education, establish the educational goal, and define the basic needs of knowledge for each student. After that, the curriculum designers need to develop the core courses, develop schedules of the elective courses, and integrate all of the courses into a whole curriculum scheme.

(4) The Phase of Teaching Planning: The researcher should design some informal curriculum teaching plans, write brief course outlines and develop some teaching materials, textbooks and set up the supportive teaching systems.

(5) The Phase of Implementation: Hold the curriculum illustration seminar, and implement the new courses.

(6) The Phase of Assessment: Make a conclusive evaluation for all classes, courses in all departments.

2. **Professor Huang Binge Wang, Leo Wing Gem and Chine Chug Yang's Developmental Model for Technological and Vocational Education Curriculum:**

Professor Huang Binge Wang presented the developmental model for technological and vocational education curriculum designing as per the Ministry of Education's invitation in 1988:

(1) The Phase of Planning: Make an outline for class development and group the research teams, each will be responsible for the evaluation of the current curriculum.

(2) The Phase of Design: Establish the curriculum goals, work out the departments and design the basic structures of the curriculum.

(3) The Phase of Development: Draw up the individual courses for each department, make the outlines of all courses, and develop teaching materials or media that are suitable for the use of the classes.

(4) The Phase of Implementation: The pre-testing and doing experiments on the new curriculum, review and revise the curriculum, and the promotion and implementation of the new courses.

3. The "Cluster" Model for Curriculum Design

The Cluster Model classified courses with the same attributes into a group, and rearranged them to develop "cluster-style" courses. The Cluster Model should be developed as the following three steps:

(1) The Phase of Concepts: During this phase, the curriculum designers need the information from human resources investigation and analysis, and after that, select and define the specific attributes of the occupation, make description and analysis of the occupation, and try to bring them into clusters.

(2) The Phase of Mathematical Development: In this phase, the curriculum designers have to develop the charts with the Cluster Style curriculum, and transform them into the contents for teaching, The analysis on teaching units, common attributes of the Cluster styles and on teaching purpose.

(3) The Phase of Implementation: to draw up the strategy and purpose of teaching, the basic and relevant technology and knowledge, and the teaching materials and methods.

4. **Skilbeck Style of Course Development Model on the School Basis:**

This model emphasizes the needs of individual schools and teachers, and includes:

(1) Make analysis for different learning environments, and according to that, provide various contents of curriculum design.

(2) Based on the predictable learning results of the students, set the goals suitable for individual students.

(3) Draw up the curriculum design, which is relevant to the teaching and learning environment, contents, information resources, teaching methods and course schedule.

(4) Focus on the problem-solving strategy during the process of curriculum implementation.

(5) Evaluation and assessment for the curriculum implementation.

These models mentioned above have their own individual attributes and specific characteristics, however, their basic designing elements are all related to the Taylor's purpose model (goal, contents, organization, assessment). Nevertheless, in order to establish an appropriate technological and vocational education developmental model, besides the consideration throughout of practical steps and design for curriculum implementation, data collecting and analyzing, facilities and equipment, the curriculum designer has to take the administration supportive system, students, and faculty, etc. into serious consideration. Therefore, it's essential to have the overall and well-organized perspectives on the curriculum design, and the more detailed the curriculum designer thinks about the curriculum structure, the more doable the implementation of the curriculum will be.

IV. The Model of Curriculum Design for Two-Year Technological and Vocational University Education:

According to the discussion mentioned above, and in order to promote the high participation of teachers and diminish the discrepancy between purpose and implementation of curriculum design, this research paper is examined thoroughly by the seminar of educational experts in order to present a technological and vocational education-oriented curriculum model shown as figure 1 in appendices.

The structure of this model can be divided into five procedures; each procedure will be divided into several steps. Each step has advantages and disadvantages. All of these advantages and disadvantages being discussed could be treated as feedback and corrected immediately. According to the evaluation of some experts, this model has some following specific characteristics:

1. Through the whole procedure of preparation, design, development, and implementation, this curriculum model is a dynamic and well-organized procedure full of response and feedback.

2. This model is based on the department-oriented curriculum design. Each professor in an individual department has more privileges on decision and participation in courses reversion so as to achieve the educational goal easily and efficiently.

3. This technological and vocational education-oriented curriculum design is based on analysis and evaluation of the need of human resources and industry field. Therefore, the contents of curriculum can be matched with the needs of human resources and technological industry accordingly.

4. This model can be adjusted flexibly according to the necessity of the fast shift of the science and technological industry field.

5. This model can be upgraded and revised regularly and easily according to the results of evaluation.

V. Case Study

To be more specific and clarify the model mentioned above, and follow the model of the figure 1 design, the researcher will take Department of Business and Technology Administration courses in the Far East Institute of Technology for an example, to describe this model clearly. The courses such as mechanical engineering, electrical engineering, and business administration in the Far East Institute of Technology have encountered some difficulties when making their curriculum designs:

1. The educational goal is vague and ambiguous; therefore, it cannot meet the main purpose of education.

2. Some professional course designs cannot meet the needs of the job markets.

3. Some courses containing professional knowledge are becoming too specific to match the integrated trends of the technology needs.

4. Some course designs cannot show the specific characteristics of the department.

5. The process of teaching is often interrupted due to the different backgrounds of the freshmen.

6. The lack of supportive course enrollment assistance during the periods of students' course enrollments will cause the course choosing to be chaotic and unsystematic.

7. Some of the students only select academy-oriented courses for the further graduate school study and ignore the practical necessity of the job market.

Due to the problems mentioned above, from the very beginning of the curriculum design for the Department of Business and Technology Administration in the Far East Institute of Technology, this curriculum model is designed attentively from the continuous experts seminar, and questionnaire investigation to ensure the educational goal, which aims to cultivate highly competent students who have both industrial and business administration ability. The curriculum designer examines the collected information to decide which items are relevant to the capacities required by job markets, and makes a priority group order in quality control, production control, financial administration, system analysis and design, marketing control, communication and foreign language speaking ability, working ethics and the other items. Throughout the discussions and debates of the curriculum committee, the items above are narrowed down into 4 items, which are regarded as the suitable educational goals and suitable framework for the curriculum designs in the Far East Institute of Technology, due to the available supportive resources in the school now. (Shown as Figure 2 in Appendices)

During the process of curriculum design, to overcome the problems of students' various academic backgrounds, there are more elective courses in the first semester for the varieties of needs of the students. Furthermore, as for the supportive course enrollment systems, in addition to the counseling system which provides the students with the suggested courses, this curriculum also puts the emphasis on the "whole set" model to give the students the sense of "continuity" in taking courses. Moreover, the curriculum design is emphasized as a spirit of "dynamic system", which means a vivid system emphasizing continuous and spontaneous feedback and reaction, which can be revised and evaluated by the information and discussion gathered from all participants in this curriculum to ensure the quality of the education. (Chao Chih Young, R.O.C 87)

When the curriculum structure is completed, the curriculum designer will plan to draw up the contents of all courses, set up the purposes of all courses, write down the unit goal of each course, select the teaching materials, and design the teaching tools, etc. (Chang Tean Jeow, R.O.C 86). At last, according to the performance of student learning, effectiveness of teacher teaching, and changes of the industrial field, the designer will evaluate and improve the curriculum design and the curriculum implementation. (Huang Jeng Chieh R.O.C 82).

VI. Conclusions and Suggestion

It will be a time-consuming and human resources-exhausting process if a school follows the methods provided by the ordinary curriculum design model. According to the practical industry situation and the seminars revised and discussed by the experts, this research tries to build a simple but practical two-year technological and vocational education curriculum structure, which contains five phases and sixteen steps, suitable for revising and correcting flexibly in regard to the reaction and feedback during the curriculum implementation.

Besides the specific features the curriculum designer has mentioned, such as: practical use, knowledge relevance, flexibility, integrality, and consistency, the researcher would like to provide the following suggestions:

1. Nowadays, the right of deciding and designing curriculum in two-year technological and vocational education is on the individual department and school themselves, therefore, a regular committee or a learning (teaching) center responsible for designing and revising curriculum should be set up as quickly as possible. This committee, responsible for responding to the analysis of the situation in the school, needs of the industry and the future trends, should arrange the curriculum properly.

2. Most of the students accepting two-year technological and vocational education come from various junior colleges, and they have strong intentions to pursue their further education in graduate school. Therefore, the curriculum design of the two-year institute of technology must contain the flexibility and consistency to adapt to the situation.

3. The curriculum design in the two-year institute of technology must put more emphasis on the larger proportion dedicated to technological, practical usage, internship and doing experiments.

4. The contents of curriculum in the two-year institute of technology must include the spirit of "whole-person education", and keep a good balance between the humanities and science.

5. The Ministry of Education in Taiwan should establish in northern, middle and southern Taiwan research centers, which are responsible for technological and vocational education, collecting the wide range of data on the various industrial fields, and establishing a database for current industry and human resources in order to be an effective reference and information center for various schools' curriculum designs and career planning.

6. Besides the thorough examination of the current industry situation and needs of the markets, the philosophy of curriculum, the psychology of learning, and the foundation of social and economic ethics should also be taken into consideration to ensure the appropriate curriculum design suitable for technological and vocational education.

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